PRACTICAL REMARKS

ON

HERNIA TRUSSES:

BEING A

MUNICATION MADE TO THE ROYAL SCOTTISH SOCIETY OF ARTS,

ON THE 24TH MARCH, 1862.

BY

JOSEPH ARBUCKLE, F.R.S.S.A.,

TRUSS MAKER,

43 SOUTH BRIDGE, EDINBURGH.

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HAVING for many years devoted special and careful attention to the making of TRUSSES and BANDAGES of every kind for the relief or cure of Rupture, and having perused many articles on the subject, both by professionals and others, I feel convinced that the real correct theory of making a perfect fitting Truss, combining ease and comfort with perfect support, has not yet been sufficiently explained, and is not generally acted upon by truss-makers; and, trusting that it may be of advantage to all parties concerned, to offer a few remarks on what has come under my own observation, and lay down such plain rules as will reduce truss-making to a system of mathematical correctness. This is the only apology I can offer for introducing to the attention of the Royal Society of Arts my practical remarks on Hernia Trusses. By some writers on Hernia, it is computed that one in every eight adults is afflicted with rupture, and that in manufacturing towns, a still larger percentage of the population require trusses. If these statistics be anything like correct, it becomes a matter of very great importance that the public be informed as to the best and cheapest rupture support; and I consider it is the duty of every man of skill and experience to state the principles on which he makes his trusses, and his reasons for presuming his principles are correct. I consider he ought to do so openly, regardless of

the petty jealousies of tradesmen, or the fear that his improvements will be copied by other makers, if such a course was adopted openly, and submitted to the judgment of scientific men, a correct knowledge would be come to as to what is best, and which would be the best guarantee the public could have against being imposed upon, for it is an evil of an otherwise glorious institution of our country, Free Trade, that there is perfect freedom in error as well as truth, in quackery as well as skilful practice.

In my brief remarks on Trusses, I do not intend to go over the whole of the various kinds, but simply the four principal sorts that are made in this country, and which embraces in principle all that are made in any country; and I wish to point out as far as I can, what I consider the merits and demerits of the various sorts.

1*st.*, Salmon and Oddy's (expired patent) Truss; or the "Ball and Socket," or "Self-Adjusting Truss;

2*d.*, Coles' (expired patent) Truss, or the "Spiral Spring Padded Truss;"

3*d.*, White's Moc-Main Patent Lever Truss, or (Dr Green's), or the "Sleeping Truss;" and

4*th.*, The Circular Spring, or "Common Truss."

Salmon and Oddy's (expired patent) Truss.

(See fig. 1.)

This truss is recommended as combining ease with pressure. It is certainly very easy in application, but not quite so much so in wearing—a very important consideration for those who require a great amount of pressure to support their rupture. The encircling springs being screwed to pads with ball and socket on the front pads gives the patient the greatest amount of freedom, as whatever position the body may be placed in, in bending, stooping, riding, or working, the side springs may alter their position; but the front pads being on a swival, will remain in the position they were placed, besides the springs being drilled at each end, the truss can be lengthened or shortened a few inches without interfering with the covering or causing any expense for alteration. But with these advantages, it must be taken into consideration that the pressure exerted by this truss is a straight inward pressure, and not an upward pressure as required in rupture. The fulcrum of this truss is the back pad, and whatever amount of pressure be re-

quired according to the rupture, the same amount of pressure is exerted on the back: for instance, suppose that four or five pounds weight of pressure is required to support a rupture, four or five pounds weight of pressure will be exerted on the back, the lower part of the spine, and a part of the body not requiring pressure; but the back pad being the fulcrum, the same amount of pressure must be there, whatever amount of pain, inconvenience, or even inflammation it may give rise to.

Cole's (expired patent) Truss.

(See fig. 2.)

This truss is recommended as combining ease with pressure, gives the greatest amount of support, and acts directly on the parts; it has spiral springs in both back and front pads, which comes and gives with every motion of the body; *at least, so it is stated*, and the principle without being tested is likely to lead to that conclusion, besides it is the neatest and finest piece of workmanship of any truss made; but it has the same objection in point of comfort as the Salmon and Oddy Truss,—viz., the fulcrum is the back pad, and the same amount of pressure is exerted on the back as is required for the front; and as to the ~~nulity~~ of the spiral springs in the pads, I can only explain that by showing the only possible action they can have when attached to an encircling spring. Suppose that four pounds weight of pressure is required on the encircling spring, and the spiral springs are regulated to the same amount, the result will be that the spiral springs will not act beyond the strength of the encircling spring, and therefore they are of no use; but supposing that four pounds weight of pressure is required on the encircling spring, and that the spiral springs are regulated to stand a strain of three pounds weight of pressure, the result will be that the spiral springs will be pressed flat before the action of the truss comes into play, and therefore they are of no use; and, in cases as the above mentioned, the result will be that the pressure of the encircling spring will press the pad forward or downward; in fact, in any possible way but the upward pressure suitable as a support to rupture. But in cases where only a few ounces of pressure is required, the patient may find it a very comfortable truss to wear, and on the same principle he may find any construction of truss the same, he requires so very little pressure on the front that he does not feel the same amount of pressure on the back hurtful; but it is no argument that the principle is correct that requires the same amount of pressure on the back as is required for the front, that some patients, according to their individual cases, are able to bear it.

The Moc-Main Patent Lever Truss, or Dr Green's, or the "Sleeping Truss."

(See fig. 3.)

According to advertisements in the daily newspapers, this truss is supported by the testimonials of upwards of 200 medical gentlemen—it is not stated, however, that the names of the leading physicians, either of Scotland or England, are included in these testimonials. Medical gentlemen would not knowingly lend their support to any article that they did not consider a benefit to mankind, they could have no possible interest in so doing, but all medical men are not necessarily mechanical men, and therefore are as liable to be imposed upon as any other class of professionals unacquainted with the principles and practice of mechanism. A test is required from every medical man before he is allowed to practise upon the public, unfortunately no such test is required from the bandage maker, and therefore he has a wide scope to tamper with the afflicted. At present any man may make and sell trusses, or articles which he is pleased to term trusses; and, however injurious they may be to the patient, he is not held responsible for the consequences.

The patent Lever Moc-Main Truss has everything to recommend it to a person who is not particularly acquainted with it; it has no spring round the body, it has a moc-main pad, and a short lever spring, and an under strap, which, when tightened and belted, will support a slight rupture. But I must beg leave to state that it is the most premative invention of a truss in the world, and is simply a tieing or bandaging of the body. The first truss of the sort was Dr Green's Truss, it then passed into the Sleeping, or "Night Truss," and lastly Moc Main has been put into the pad instead of hair or flannel, and Her Majesty's Letters Patent added, which completes an otherwise very defective instrument. As an illustration of this, let a patient who is afflicted with rupture lie on his back with the legs slightly drawn up, and the muscles relaxed, then press the gut back into its proper place, then tie a handkerchief round his body, and place a pad, or even the half of a jargonell pear, on the orifice, tie another handkerchief behind, and bring it up in front, and fasten it tightly, it will be as perfect a support as any Moc-Main Truss, because it is the same in principle; but though an amount of binding, tieing, and strapping, will in cases of emergency support a very slight rupture, that mode cannot be said to pass into the domain of art, it is justifiable only as an application of the only natural means at hand in places where there is no art, or at least under circumstances where artistic appliances cannot be had. The term "Moc-Main,"

from its not being generally understood by the public, is liable to mislead. By many it is considered to refer to the principle on which the truss is made, whereas it only refers to the material with which the pad is stuffed. It is not necessary in an article like the present to enter into a long explanation of the nature and properties of Moc-Main; but for the information of those who may not know what it is, or rather who may never have put themselves to the trouble of inquiring, suffice it to say that Moc-Main means neither more nor less than a silk-cotton substance grown in India, on what is called the Silk-Cotton Tree, and resembles unspun silk or unspun cotton; it is elastic, but not more so than flannel, and not so much so as hair. With this material the pad of the truss referred to is stuffed, but the name it goes by shields it from those objections, which would be offered to the Patent Lever, Hair, Cork, or Flannel Padded Truss, any of which is so easily understood. The Moc-Main Truss gives no support whatever, however tightly it is belted round the body, without the application of the under strap (or Thigh Strap), it is by the tightening and strapping of both, that any support is afforded to rupture. An under strap, at all times a very uncomfortable article to wear, is in warm weather, or where the patient is subjected to hard work, quite unbearable, and should in every possible case be dispensed with.

The Circular Spring, or Common Truss.

(See fig 4.)

This truss is of very old date, it was the first invention of a Spring Truss, it is still the most common in use, being the cheapest truss it suits that class who cannot afford to pay for expensive quackery. When made on correct principles it is still the best truss, when otherwise made it is the most uncomfortable, and often serious results follow the wearing of a bad fitting common truss. The common system adopted in making this truss is to form the spring out of a straight stripe of steel-plate bent round in the shape of the body, and the pad twisted in at the bottom to give pressure or support; but as the human body is not a straight smooth pillar, it is plain that a truss made on this principle cannot fit correctly. To illustrate this, take a straight strip of steel or iron-plate and bend it into a circle, and try how it will fit a cask or tub, he will find that one edge only of the hoop will rest on the cask or tub, the other edge will be quite open; but, if on the other hand, before making a hoop of it, it be bent on edge in the shape of a sabre, it will then fit closely, according to the degree of incline on the article on which it is

fitted. The same principle holds good in a common truss, if made of a straight stripe, the common result is that the under edge only of the spring rests on the back, and the twisting of the front pad downwards, causes the upper edge only of the spring to rest on the pelvis bone; but twist it or bend it as you may, it is impossible to make the truss fit *closely all round;* nevertheless, a truss of this sort may, to all outward appearance, resemble a perfect fitting truss so closely, that the difference is not easily seen, except by a person of experience; but the reason of this is easily explained—suppose you take a hoop off a cask, and put a soft stuffing of three or four ply of flannel, and two or three ply of leather on it, it will not be quite so easy then to tell which is the longest edge of the hoop; it is so with a common truss, when worn a day or two, and the stuffing has got flattened down, then the real formation of the spring is seen and felt; and hence the common remark made by those who have to wear them, that they are more comfortable for the first day or two, and then they begin to hurt.

To make a perfect fitting truss the spring should be bent on edge in the shape of a sabre at the back, and in the opposite direction in front, making a slight imitation of the letter S., and the tail end of the spring bent also a little down in front, to be in a line with the front strap, when fastened to the pad, and prevent the end of the spring from cutting the covering. As the hips spread outward below the spine, the under edge of the spring at the back should be longer in measurement than the upper edge, in order that the truss may be flat on the back, *and not on edge*, and as the belly slopes inward towards the abdominal ring, the upper edge of the spring in front should be longer in measurement than the under edge, in order that it may also fit flat in front. A truss made correctly on this principle will fit as closely as if it *was a part of the body*, and be a perfect support to rupture, and whatever amount of pressure be required according to the nature of the case, the fulcrum pressure being equally distributed round the body will not be felt. The pressure exerted by this truss does not require to be great, being an upward pressure, and filled so that it cannot get out of its place. In many cases a rupture is supported by great strength of spring; in fact, by fair physical force, instead of the gentle lifting pressure which a patient would apply in supporting a rupture with his own hand, and which is attained by a Perfect Fitting Truss on the principle I am describing. I do not presume to be the inventor of the Common Truss with the spring curved as described here, but I have found it a good theory, in most cases wrongly applied, and if I am able to unite theory with a perfect system of application, in such a way that they cannot be disunited, I shall have done something for the interests of art manufacture, and there will then be no more bad fitting trusses. Some make trusses on the principle de-

scribed, but where the one curve is carried out almost the entire length of the spring, and therefore the good they do at the back in fitting closely is counteracted by the harm they do in front, this is caused in the first place by a want of the knowledge of *how to measure for a truss;* and, secondly, by a want of knowledge of *how to make a truss to the measure.* As I am now at that part of my article which will command the strictest criticism by every one at all acquainted with the subject, or having an interest in it, I must be pardoned for detailing at some length and making very plain the two ways—the right and the wrong. The common system of measuring for a truss is to take the circumference of the body, and the general directions sent to any patient at a distance are all summed up in these words, "Send the circumference of the body two inches below the hips, and state for which side, or if for both." The circumference of the body gives the size required, but gives *no idea of shape.* A man might as well take the circumference of a round and the circumference of an oval, and say they were both alike, merely because the measurement might be the same.

The system I have adopted in measuring is this,—first take the circumference of the body, then take from the right to the left pelvis bone; or, in other words, the calliper measure of the breadth of the body at the pelvis, then take the distance from the pelves bone to the rupture; in these three measurements the one will correct the other, like the simple rule in arithmetic of proving a sum in addition, and give a correct idea of shape as well as size, and in proportion to the breadth of the body as compared with the circumference, in the same proportion will the body be thin and flat, or round and plump, if round and plump, then the curves and angles of the spring will require to be more acute (see fig. 5); if thin and flat, then the angles and curves of the spring will require to be more obtuse (see fig. 6), and partaking but very slightly of the S shape, and by adopting this system of measuring and making to measure, the curve required, and the exact shape of spring required according to the case, will be come at without even seeing the patient; of course, it is easier for a truss-maker to make a perfect fitting truss even on these principles where he has the measuring and fitting of the truss himself, but that is only because the directions may not always be properly attended to by those at a distance.

The spring of the truss, made on the principle described here, and adapted to the shape of the patient, the pad which supports the rupture may be made any size, or any shape according to the case, and it may be stuffed with flannel, hair, or even Moe Main, or any other material suitable for a stuffing, or even an India rubber air pad may be applied, it is the easiest to wear of any pad, but it is not durable, and therefore not economical; besides the other advantages of this truss, it requires no

under strap except in very extraordinary cases; indeed it is only in cases where the patient is very old and feeble and the body *not thin* but the parts soft and watery that any addition to the truss will be required at all, and in these cases a very thick and soft stuffed strap may be applied just as a continuation of the pad, for in these cases the muscles are so soft, and like all other members of the body *worn out*, will not so easily resume their proper functions; and a truss made to suit an ordinary case may in this case, from the size of the pad, or strength of the spring, be unsuitable, as the entire amount of gut escaped from the orifice may not be so easily felt, and the pad may press in on the orifice and leave the gut protruding on all sides of the pad, above and below, but especially below; in these cases it is best to make the spring of the truss broad, though not strong, and the pad large but well fitted, and in every case the spring must be made on the correct anatomical principles of adaptation to the shape of the body as described here.

The truss I have described will perform a perfect cure on children, and may be applied with safety on an infant two weeks' old.

The only defect in the Common Truss, even with the above mentioned improvements in measurement, &c., I have endeavoured to remove, and I think I have been successful. When a truss is worn a few days the stuffing gets flattened, and then the truss is larger than it was when the stuffing was new, or in cases where the patient is troubled with flatulence, or any other disorder affecting the measurement; in fact, in any case where a patient will measure more this week than he will do a week hence, the truss will be too large, and the pad will pass the proper place. To obviate this, and to regulate the truss at all times to a hairsbreadth in nicity, I have made the spring in two pieces, the front part about three inches from the pad to elongate or shorten from one to two inches without trouble, by having a slit cut in the end of the front part of the spring, making it to slide through a clasp on the end of the other part of the spring and tighten it with a screw to the size required. In addition to this, I have applied a pad suitable for Femoral Hernia, also for the cure of Varicocele, the extreme end of the short spring with the slit cut in it to lengthen or shorten is screwed to the pad, and half an inch from the end there is another slit cut in the spring a part of a circle, which allows the pad to be fixed in any particular direction required.

The above remarks and directions on single trusses refer with equal force to double trusses, the principle of making and fitting is in every respect the same, but a double truss is for many reasons better than a single truss, only that it is double the price.

There are very few cases of double rupture but what were single

at one time, and the wearing of a double truss would have prevented the rupture on the side last affected. It is easier to wear a double truss than a single one, on the principle that it is easier to carry two pitchers of water than one, because the body is more balanced, an inward pressure on any one particular part has a natural tendency to press outward some other part. If you press your elbow down on one part of a pillow the other part of the pillow will be raised up in consequence; in like manner, pressure on one particular part of the bowels, particularly if it be a strong pressure, has a tendency to press outward the opposite side; and, when you add to that, that there is a weakness in the parts of those who are afflicted with rupture, which renders this additional precaution the more advisable, although it is not absolutely necessary; but, in cases of children or infants, where a speedy cure is not only desirable but obtainable, with due attention to the above rules, a double truss is by far the best, as the restlessness of children, and the stress of crying, is apt to augment the complaint, and renders additional precaution in these cases necessary.

I beg now to introduce to your notice improvements in working tools for making trusses. First, shears for cutting steel plate; I have found in my experience that steel which is rolled into stripes, purposely for making trusses, is not to be depended on, as the edges of the stripes are often unsolid, and these faults in the steel cannot be detected until the spring is tempered, when in opening the spring it will break at any part where the steel is unsolid. I have found it better to cut the springs out of *sheet* steel and file up the edges; but as steel is not all of the same softness while in the sheet, the less that it is bent or twisted in cutting the better for the safety of the springs, the nearer the nail or joint of the shears the more powerful the leverage; in ordinary shears for cutting plate, the nail or joint is in the centre, and a part of the best leverage is lost, because shears will not cut until the blades are at a particular angle. The shears I have contrived for the purpose have the joint at one side and below the level of the blades, which admits of the sheet passing along the blades and above the joint without being bent in the process of cutting; and the leverage is so great, that a pair of shears on this principle, will do the work of a pair double their weight of the ordinary sort.

The next thing I have to introduce, as an improvement in working tools, is a very simple punching-block for making holes in steel plate, and which will even punch holes in tempered steel without breakage. It is simply a block of steel, with three holes in it at the respective distance from each other required for punching holes in truss springs and the iron pads before *riveting* them together. Simple as the above improvements are

they are a saving of at least one-half of the labour in making springs; and the punching tool, so far as truss-making is concerned, answers all the purpose that those very expensive punching machines, which are to be seen in engineers' workshops, would. I trust the Royal Society of Arts will, in consideration of the above remarks, believe that I am anxious to contribute my mite towards improvement, and hope the Society will put to the test the accuracy of these rules I have laid down on a subject of so much moment to the public.

The foregoing remarks are an exact copy of the paper I read before the Royal Scottish Society of Arts. I have now only to add that I have not been able, like Homer of old, to write as much as the Twelve Books of Illiad, and cram it all into a nut-shell. In other words, I could not give the experience of twenty years in one short address, or enter fully into detail of all the various articles offered to the public, *with numerous testimonials*, as the most efficient for the relief or cure of rupture. Whatever be the political sentiments of truss-makers in general, there can be no doubt that in matters of business many of them are thorough protectionists; for the smallest alteration, whether it be an improvement or not, is patented, and in almost every city there are patentees, where the articles they patent are only a modification of others in use, and differ nothing in principle.

As stated on the first page, by some writers on Hernia, it is computed that one in every eight adults is afflicted with Hernia. This is an extract from a London Bandage Maker's pamphlet, and the computation is there stated to be derived from the reports of the various institutions for the gratuitous relief of the poor, suffering from Hernia. I may state, however, that by others it is computed one in every ten; but from my own experience, so far as I am able to judge, I am rather inclined to think that these statistics are an exaggeration; but suppose there is only one in every twenty, which is a lower average than any that I know of have given, it is still a very large number of the inhabitants of this country requiring trusses, and as such, it is of importance that the public have a better knowledge of the merits of the various articles submitted to them, for many who have worn trusses for a number of years, and have had several changes, can testify that high prices do not always secure comfort, and that patents, while they may support the patentee, do not always support rupture.

Those interested in Trusses, and visiting the International Exhibition, will see in class 17, an Inguinal and Femoral Hernia Truss with Illustrations, showing the curves and angles required for correct fitting.

In submitting a list of a few of the mechanical appliances for the Relief or Cure of Weakness or Deformity, I may state that while I do not lay claim to anything particularly new, I have made it my study to make them anatomically correct, and work them up to the highest standard of modern surgical mechanism, only selecting from a great variety the few I have found most suitable for the purposes intended.

TRUSSES FOR THE RELIEF OR CURE OF INGUINAL, SCROTAL, FEMORAL, OR UMBILLICAL HERNIA.
Do., FOR THE CURE OF VARICOCELE.
PROLAPSUS ANI SUPPORTS.
PROLAPSUS UTRI do.
SUPPORTS FOR PENDULOUS ABDOMIN.
ABDOMINAL SUPPORTS FOR LADIES IN SILK OR COTTON ELASTIC WEB.
SURGICAL ELASTIC STOCKINGS, KNEE-CAPS, ANKLETS, LEGGINGS, &c., FOR WEAKNESS, SPRAINS, SWELLINGS, OR VARICOSE VEINS, IN SILK OR COTTON.
SUSPENSORY BANDAGES IN SILK OR COTTON NET.
MALE AND FEMALE URINALS.
SYPHONS AND OTHER ENIMA APPARATUS.
BACK BOARDS, FOR PREVENTING STOOPING OF THE SHOULDERS.
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Fig. 1.

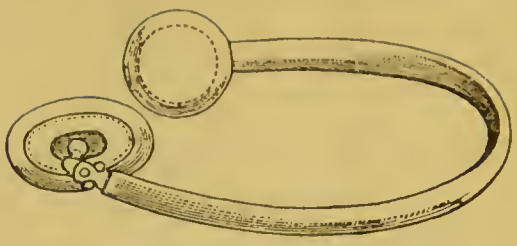

Fig. 2.

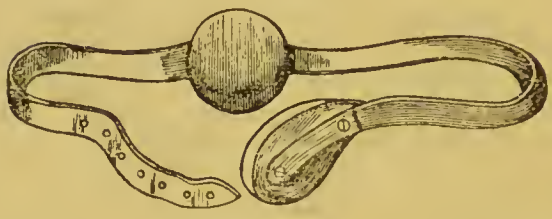

Fig. 3.

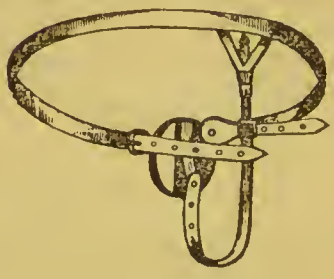

Fig. 4.

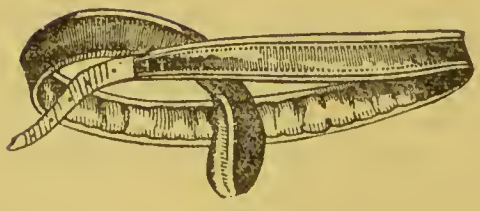

Fig. 5.

Fig. 6.

Fig. 7.